METROLOGY CALIBRATION PROCEDURE

COMMUNICATIONS TECHNOLOGY CORP.
DAVAR 50 and CAS 2000
AUTOMATED CABLE TESTER

Technical Review Copy only

DO NOT USE

Return to Curt Casto with comments

MCP-0003

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1.0 PREPARATORY INFORMATION

1.1 This document describes an approved method of calibration for the Communications Technology Corporation models Davar 50 or CAS 2000 hereafter referred to as the Unit Under Test (UUT).

1.2 Unless otherwise specified on the Calibration Data Sheet/s it may be assumed that the standards used in the performance of this MCP meet or exceed a 4:1 tolerance uncertainty ratio with the UUT.

1.3 Throughout this procedure you will be instructed to "RECORD" data on the Calibration Data Sheets. If the customer does not require recorded data the instruction to "RECORD" data may be interpreted as requiring the technician to utilize the Calibration Data Sheet as a reference for UUT tolerances.

2.0 PRELIMINARY REQUIREMENTS

2.1 Refer to table 2-1 for a list of the standards recommended for use with this procedure. These are standards known to be available at the time of this writing. Any laboratory standard with the required accuracy ratio may be used in place of the standards listed.

Standard Requirements:	Recommended Standards:
DC Voltage Calibrator: Range: 0 to 250 VDC Accuracy: +/- 0.25% I.V.	5100B Fluke
AC Voltage Calibrator: 10 dB @ 577 Hz (Reference only)	5100B Fluke
AC Voltmeter: Range: 15 dBm @ 577HZ Accuracy: N/A	87 Fluke
Decade Resistor: Range: 40kΩ to 1.2MΩ Accuracy: +/-0. 25%	1432 or 1433 Models General Radio
Decade Capacitor: Range: .083 ufd Accuracy: +/- 0.5%	1412 or 1419 Models General Radio
Oscilloscope: Accuracy:(Reference only)	2235 Tektronix
Special Equipment of local stock/manufacturer:	
Loop-Back Test Plug *(see attachment 1)*	Local Mfr
Trouble Simulator *(see attachment 2)*	Local Mfr
Multi-Load/Multi-Span Cable Network Simulator *(see attachment 3)*	Local Mfr
Two Headsets or two Telephone Handsets	Local Stock
NOTE: *ACCURACIES LISTED ARE THOSE REQUIRED FOR A 4:1 T.U.R.*	

Table 2-1. Recommended Standards and Standards Requirements

3.0 EQUIPMENT SPECIFICATIONS

3.1 Table 3-1 lists the UUT's specifications.

3.2 Visual Inspection

3.2.1 Perform a visual inspection of the UUT for signs of physical damage that might create a hazardous condition in use.

3.3 Cleaning

3.3.1 Clean the UUT exterior with a soft cloth dampened in a mild solution of detergent and water. Do not attempt to clean the UUT interior.

DC VOLTMETER: Range: +/- (0 to 250VDC) Accuracy: (0 to 75VDC) +/- 1% I.V. (75 to 250VDC) +/- 2% I.V. **OHMMETER:** Range: +/- (0 to 1.5 Mohms) Accuracy: (0 to 100KΩ) +/- 1% I.V. (100K to 330KΩ) +/- 2% I.V. (330K to 1.5MΩ) +/- 5% I.V. **CAPACITANCE METER:** Accuracy: (200' TO 8,000') +/- 2% I.V. (>8,000 feet) +/- 4% I.V. **IMPEADANCE METER:** Range: 400 ohms to 4,000 ohms Accuracy: +/- 2% I.V.	**LOAD COIL MEASUREMENTS:** Range: 1 to 6 loads Measured Value: Accuracy: (1 to 4 loads) +/- 5% I.V. (4 to 6 loads) +/- 10% I.V. Spacing: Accuracy: (1 to 4 loads) +/- 5% I.V. (4 to 6 loads) +/- 10% I.V. Sections: Front: 2,700 to 3,300 feet End: >4500 feet **TONE GENERATOR:** Output Frequency: 577Hz Accuracy: +/- 2% of I.V. Level: 15 dBm Interrupted: 100 mS on and 200 mS off Impedance: 600 Ohms

Table 3-1. UUT specifications. *(refer to the Manufacturer's manual for complete specifications.)*

4.0 CALIBRATION

NOTE: The UUT should be fully charged for 24 hrs prior to calibration. The Davar 50 and CAS 2000 will indicate false troubles when batteries are low, even before low battery indications are displayed. A functional printer is required for calibration. Unlock the UUT's printer and verify that the printer has paper and is properly fed. Refer to section 2.3.03 and 2.3.04 of "DAVAR SYSTEM III OPERATIONS MANUAL" for paper installation and printer operation.

4.1 Self Tests

4.1.1 Make the following observations and record PASS on the Calibration Data Sheet if all criterion are met:

1. Turn the UUT on and set volume control knob to mid range.
   A. An audible tone should be heard briefly.
   B. "DAVAR III" printed on the old display
   C. A series of numbers ie;"00.02.03:22" (date and time)printed on new display.
   D. No abnormal UUT display segments or indications, ie; segments out, flashing segments ect.

.2 Make the following observations and record PASS on the Calibration Data Sheet if all criterion are met:

1. Press the UUT's print key. The printer's ON indicator should illuminate.
2. Toggle the printer's FEED switch a few times, paper should feed.
3. Press the UUT DELETE key. The printer's "ON" indicator should extinguish.

4.2 Auto Buzz Tests

4.2.1 Initialization

4.2.1.1 Perform the following key press (refers to keys on the UUT's keypad)sequence to delete bridging on all pairs: STOP, AUTO, DELETE, START. UUT will display: "DELETING ALL". a few seconds will be required for the UUT to execute this program. (this step is required to unbridge any pairs that may be randomly bridged when the UUT is turned off).

4.2.2 Opens Test

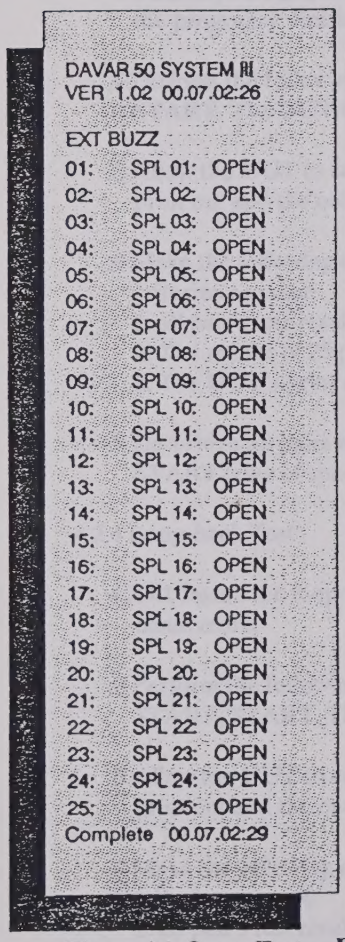
4.2.2.1 Perform the following key press sequence: AUTO, CONT, START, START, START, START. The UUT will initiate auto testing of old to new pairs.

.2 Allow the UUT to complete the program initiated in step 4.2.2.1 then observe the UUT's print out and the one displayed in figure 4-1.

.3 Perform the following observations and record PASS on the Calibration Data Sheet if all criterion are met:

1. all pair's test results indicate "OPEN"
2. The results of 25 pair tests are printed.
3. The UUT's print out format matches that of the one displayed in figure 4-1.

UUT PRINT OUTS FOR AUTO BUZZ TESTS



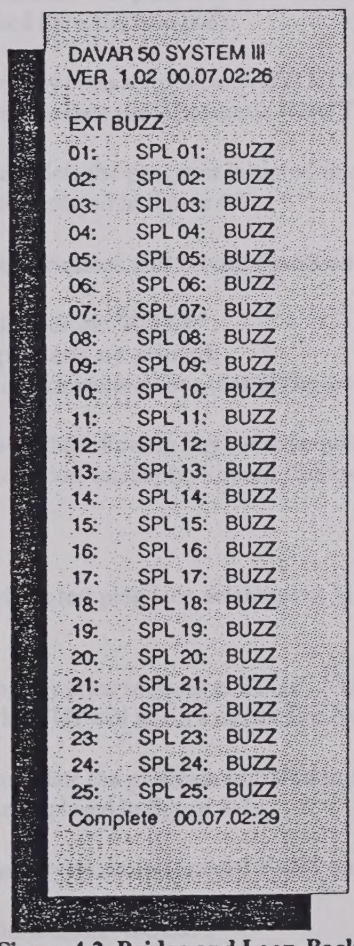
DAVAR 50 SYSTEM III
VER 1.02 00.07.02:26

EXT BUZZ

01:	SPL 01:	OPEN
02:	SPL 02:	OPEN
03:	SPL 03:	OPEN
04:	SPL 04:	OPEN
05:	SPL 05:	OPEN
06:	SPL 06:	OPEN
07:	SPL 07:	OPEN
08:	SPL 08:	OPEN
09:	SPL 09:	OPEN
10:	SPL 10:	OPEN
11:	SPL 11:	OPEN
12:	SPL 12:	OPEN
13:	SPL 13:	OPEN
14:	SPL 14:	OPEN
15:	SPL 15:	OPEN
16:	SPL 16:	OPEN
17:	SPL 17:	OPEN
18:	SPL 18:	OPEN
19:	SPL 19:	OPEN
20:	SPL 20:	OPEN
21:	SPL 21:	OPEN
22:	SPL 22:	OPEN
23:	SPL 23:	OPEN
24:	SPL 24:	OPEN
25:	SPL 25:	OPEN

Complete 00.07.02:29

Figure 4-1. Opens Test



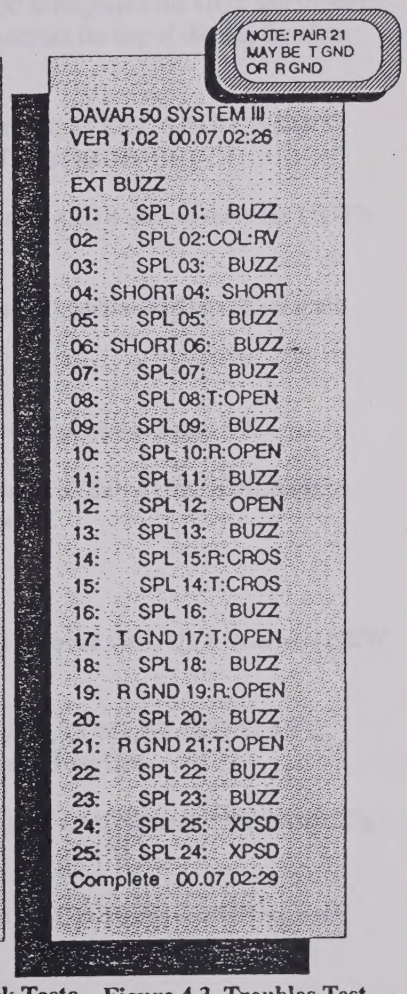
DAVAR 50 SYSTEM III
VER 1.02 00.07.02:26

EXT BUZZ

01:	SPL 01:	BUZZ
02:	SPL 02:	BUZZ
03:	SPL 03:	BUZZ
04:	SPL 04:	BUZZ
05:	SPL 05:	BUZZ
06:	SPL 06:	BUZZ
07:	SPL 07:	BUZZ
08:	SPL 08:	BUZZ
09:	SPL 09:	BUZZ
10:	SPL 10:	BUZZ
11:	SPL 11:	BUZZ
12:	SPL 12:	BUZZ
13:	SPL 13:	BUZZ
14:	SPL 14:	BUZZ
15:	SPL 15:	BUZZ
16:	SPL 16:	BUZZ
17:	SPL 17:	BUZZ
18:	SPL 18:	BUZZ
19:	SPL 19:	BUZZ
20:	SPL 20:	BUZZ
21:	SPL 21:	BUZZ
22:	SPL 22:	BUZZ
23:	SPL 23:	BUZZ
24:	SPL 24:	BUZZ
25:	SPL 25:	BUZZ

Complete 00.07.02:29

Figure 4-2. Bridge and Loop-Back Tests



NOTE: PAIR 21
MAY BE T GND
OR R GND

DAVAR 50 SYSTEM III
VER 1.02 00.07.02:26

EXT BUZZ

01:	SPL 01:	BUZZ
02:	SPL 02:	COL-RV
03:	SPL 03:	BUZZ
04:	SHORT 04:	SHORT
05:	SPL 05:	BUZZ
06:	SHORT 06:	BUZZ
07:	SPL 07:	BUZZ
08:	SPL 08:	T:OPEN
09:	SPL 09:	BUZZ
10:	SPL 10:	R:OPEN
11:	SPL 11:	BUZZ
12:	SPL 12:	OPEN
13:	SPL 13:	BUZZ
14:	SPL 15:	R:CROS
15:	SPL 14:	T:CROS
16:	SPL 16:	BUZZ
17:	T GND 17:	T:OPEN
18:	SPL 18:	BUZZ
19:	R GND 19:	R:OPEN
20:	SPL 20:	BUZZ
21:	R GND 21:	T:OPEN
22:	SPL 22:	BUZZ
23:	SPL 23:	BUZZ
24:	SPL 25:	XPSD
25:	SPL 24:	XPSD

Complete 00.07.02:29

Figure 4-3. Troubles Test

4.2.3 bridge test

4.2.3.1 Upon completion of the program executed in step 4.2.2.1 the UUT should display "SELECT PROGRAM", if it does not make the following key press: STOP.

.2 Perform the following key press sequence: AUTO, BRIDGE, START. The UUT will display "BRIDGING ALL PAIRS" followed by "STANDBY" while bridging relays operate.

.3 Allow the UUT to complete the program initiated in step 4.2.3.2. This will take approximately 20 to 30 seconds. (if "DELETE PR XX" is displayed the UUT will require a battery charge.) The UUT will print a row of dots accross the top of the display when the program is finished (all pairs bridged).

.4 Perform the following key press sequence: AUTO, CONT, START, START, START, START. The UUT will initiate the Automatic Buzz Test program.

.5 Allow the UUT to complete the program initiated in step 4.2.3.4 then observe the UUT's print out and the one displayed in figure 4-2.

.6 Make the following observations and record PASS on the Calibration Data Sheet if all criterion are met:
1. all pair's test results indicate "BUZZ" .
2. The results of 25 pair tests are printed.
3. The UUT's print out format matches that of the one displayed in figure 4-2.

.7 De-bridge all pairs with the following key press sequence: STOP, AUTO, DELETE, START (row of spaced dots on display should dissapear).

4.2.4 Loop-back Test

4.2.4.1 Install the loop-back test plug (see attachment 1) between the UUT's OLD and NEW connectors.

.2 Perform the following key press sequence: STOP, AUTO, CONT, START, START, START, START. The UUT will again execute the Auto Buzz Test.

.3 Allow the UUT to complete the program initiated in step 4.2.4.2 then observe the UUT's print out and the one displayed in figure 4-2.

.4 Make the following observations and record PASS on the Calibration Data Sheet if all criterion are met:
1. all pair's test results indicate "BUZZ".
2. The results of 25 pair tests are printed.
3. The UUT's print out format matches that of the one displayed in figure 4-2.

.5 Disconnect the Loop-back test plug from the UUT.

4.2.5 Simmulated Troubles Test

4.2.5.1 Install the Trouble Simmulation plug (see attachment 2) between the UUT's OLD and NEW connectors.

.2 Connect the Trouble Simmulation plug's ground terminal/cable to the UUT's ground terminal.

.3 Perform the following key press sequence: STOP, AUTO, CONT, START, START, START, START. The UUT will yet again execute the Auto Buzz Test.

.4 Allow the UUT to complete the program initiated in step 4.2.5.3 then observe the UUT's print out and the one displayed in figure 4-3.

.5 Make the following observations and record PASS on the Calibration Data Sheet if all criterion are met:
1. The results of 25 Pair Tests are printed.
2. all pair's test results match those listed in figure 4-3 (the only exception is that pair 21 may indicate "T GND" OR "R GND".
3. The UUT's print out format matches that of the one displayed in figure 4-3.

.6 Disconnect the Trouble Simmulation plug from the UUT.

4.3 TONE, PROBE and TRACE TONE TESTS

4.3.1 Trace Tone Detection with the Amp Probe

4.3.1.1 Connect the equipment as shown in figure 4-4.

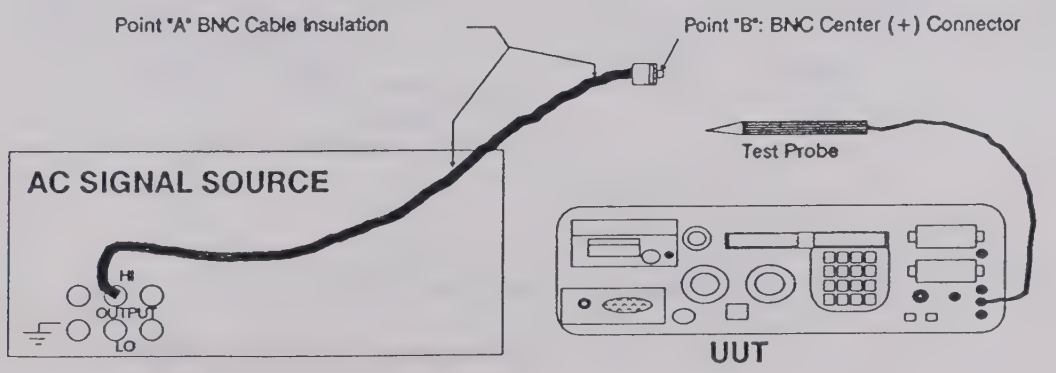


Figure 4-4. Trace Tone Detection With the Amp Probe

4.3.1.2 configure the AC Signal Source to output 577 Hz @ +10 dB.

.3 Set the UUT volume control to approximately mid-range.

.4 Perform the following key press sequence: STOP, ID, TONE (the UUT display should indicate "AMP PROBE").

.5 Make the following observations and record PASS on the Calibration Data Sheet if all criterion are met:

1. Place the UUT's Amp Probe tip at approximately point "A" as displayed in figure 4-4.
   A. An audible tone should now be heard from the UUT's speaker (tone will only be present while Probe tip to cable close proximity/contact is maintained).
2. Place the UUT's Amp Probe tip at approximately point "B" as displayed in figure 4-4.
   A. An audible tone should now be heard from the UUT's speaker that is noticably louder than that observed when the UUT's probe tip was at point "A" (Probe tip must be in contact with exposed cable end).

.6 Disconnect amp probe from amp jack.

4.3.2 Sending Tone on Old Pair Number 0

4.3.2.1 Connect the equipment as shown in figure 4-5.

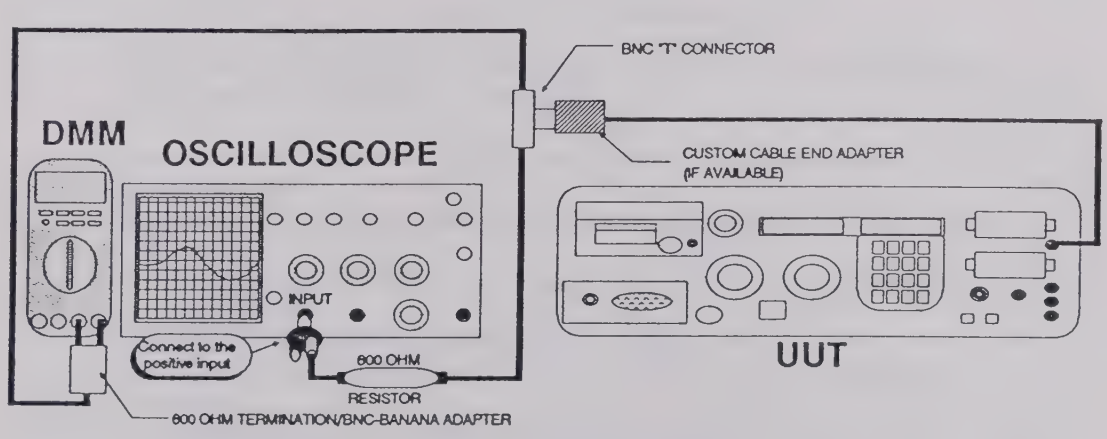


Figure 4-5. Sending Tone on Old Pair Number 0

.2 Set the UUT's "OLD" Rotary switch to pair 0.

.3 Perform the following key press sequence: STOP, TONE, OLD(this will place a 577 Hz, interrupted tone @ +10 dB on the Tip and Ring leads of what ever pair the UUT's "OLD" rotary switch is set to).

4.3.2.4 Measure the frequency of the Tone Signal at the UUT Pair 0 jack using the oscilloscope (a frequency counter will be unable to accurately measure the frequency of this signal as a result of 100 mS interruption).

.5 Record PASS on the Calibration Data Sheet if the indication obtained from the Oscilloscope is approximately 577 Hz.

.6 Observe the Oscilloscope display (configured as neccessary) and record PASS on the Calibration Data Sheet if the interruption is present and has a duration of approximately 100mS.

.7 Observe the Level Meter/DMM (configured as neccessary) indication and record PASS on the Calibration Data Sheet if the Tone Signal measured has an amplitude of approximately +15 dBm.

.8 Disconnect the equipment.

4.3.3 Sending Tone on all Pairs (OLD and NEW)

NOTE: The following tests are intended as a functional test only. The UUT's Tone signal parameters have been verified in the previous section (4.3.2) and therefore, quantitative determinations are not required to verify proper UUT operation. It is the intention of this section to verify that no appreciable signal loss or distortion occurs.

4.3.3.1 Select the UUT's OLD rotary knob PAIR 1 position.

.2 Disconnect the cable that runs from the tee connector to the UUT in figure 4-5. and attach a probe tip cable to the tee connector.

.3 Make the following observations and record PASS on the Calibration Data Sheet if all criterion are met:

1. Probe the Pair 1 Ring pin (refer to figure 4-6 for a pin diagram) of the UUT OLD connector.
   A. The Tone signal should be present (approximately 577 Hz with 100 mS interruption @ +15 dBm).
2. Select the UUT's OLD rotary knob PAIR 1 position.
3. Probe the Pair 1 Tip pin of the UUT OLD connector and verify that the Tone signal is present.
4. Select Each UUT OLD rotary knob Pair position and verify the presence of the Tone signal on Ring and Tip pins of the UUT OLD connector.
5. Press The UUT NEW key (Places Tone signal on the UUT NEW connector.
6. Select Each UUT NEW rotary knob Pair position and verify the presence of the Tone signal on Ring and Tip pins of the UUT NEW connector (refer to figure 4-6 for a pin diagram).

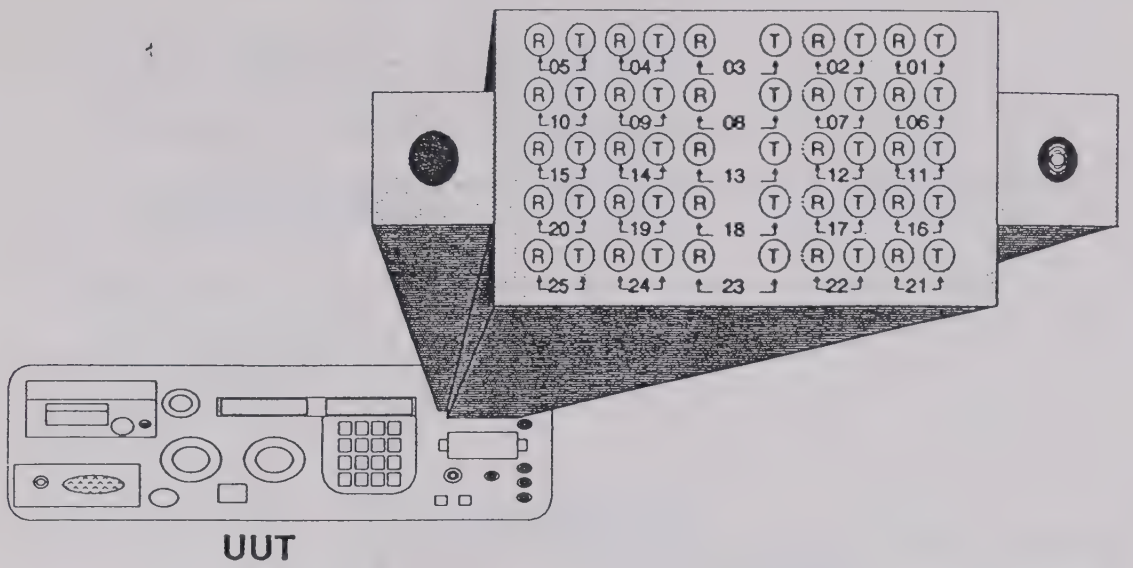

R T R T R T T R T R T
05 04 03 02 01
R T R T R T T R T R T
10 09 08 07 06
R T R T R T T R T R T
15 14 13 12 11
R T R T R T T R T R T
20 19 18 17 16
R T R T R T T R T R T
25 24 23 22 21
UUT

Figure 4-6. Sending Tone on All Pairs (OLD and NEW)

4.4 METERING CIRCUITS TESTS

4.4.1 Voltmeter Tests

4.4.1.1 Connect the Equipment as shown in figure 4-7.

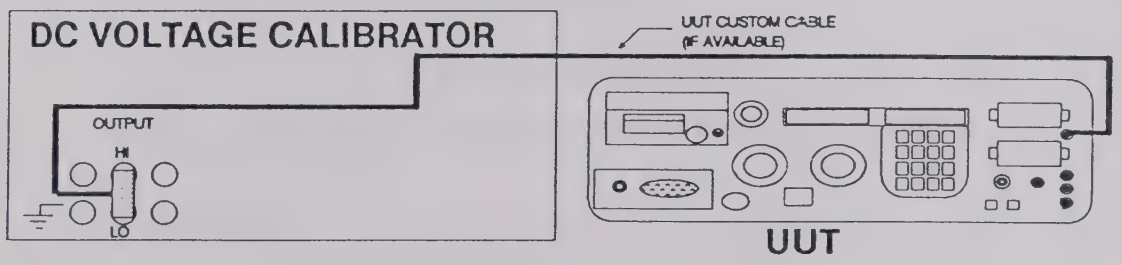


Figure 4-7. Voltmeter Tests

4.4.1.2 Perform the following key press sequence: STOP, VOLTS, OLD, and RT.

.3 Select pair 0 on the UUT OLD rotary switch.

.4 Program the DC Voltage Calibrator to output 25 VDC.

.5 Record The UUT indication on the Calibration Data Sheet.

.6 Use the Method described in steps 4.4.1.4 and 4.4.1.5 for each DC voltage value listed on the Calibration Data Sheet.

4.4.2 Resistance Tests

4.4.2.1 Connect the Equipment as shown in figure 4-8.

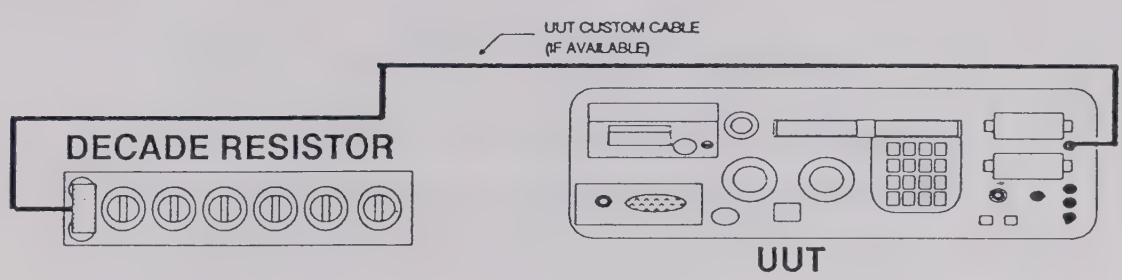


Figure 4-8. Resistance Tests

.2 Perform the following key press sequence: STOP, RES, OLD, and RT.

.3 Set the Decade Resistance Standard to 40 K Ohms.

.4 Record The UUT indication on the Calibration Data Sheet.

.5 Use the Method described in steps 4.4.2.3 and 4.4.2.4 for each resistance value listed on the Calibration Data Sheet.

4.4.3 Capacitance Tests

4.4.3.1 Connect the equipment as shown in figure 4-9.

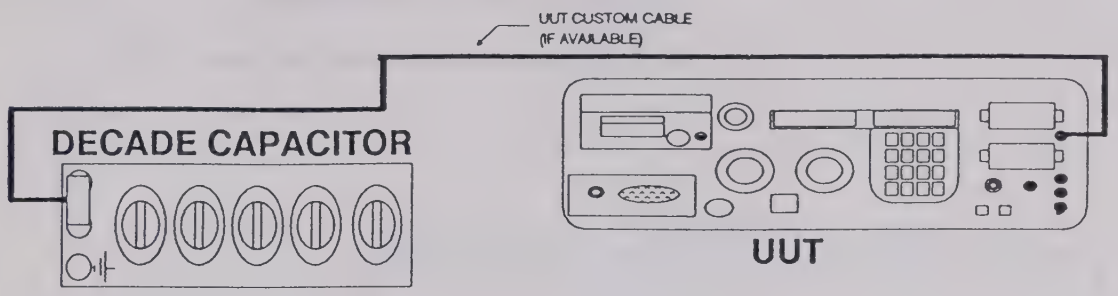


Figure 4-9. Capacitance Tests

4.4.3.2 Perform the Following key press sequence: STOP, REF, and ID.

.3 If the the UUT OLD display reads "KM ON" press the UUT START key.

.4 If the the UUT OLD display reads "KM OFF" press the UUT STOP key.

.5 Perform the following key press sequence: REF, CAP.

.6 If the UUT does not display "0.083 UF/MI" (United States Standard) then perform the following key press sequence: 8, 3, 0, START.

.7 Perform the following key press sequence: STOP, CAP, OLD, RT (selects the Capacitance and Distance modes).

.8 Set the Decade Capacitance Standard to .083 ufd.

.9 Record The UUT indication on the Calibration Data Sheet.

.10 Press the UUT REF key and record The UUT indication on the Calibration Data Sheet.

4.4.4 Impedance Tests

NOTE: The Reccommended Standard for use in this section is the Multi-Load/Multi-Span Cable Network Simmulator described on attachment 3. If this Standard is not available a 1000' spool of 22 gauge, shielded, twisted pair wire may be used. If the spool of wire is used, it must be charachterized at the required frequencies prior to use. An annotation on the Calibration Data Sheet will be required.

NOTE: The following is an example and explination of a typical UUT display in the configuration used throughout this section:
UUT INDICATION: "0 F400 .475KZ:RT"
INTERPERTATION: Pair 0, Frequency = 400 Hz, Measured Impeadance = .475 KZ,
Impeadance was measured RING to TIP.

4.4.4.1 Connect the Equipment as shown in figure 4-10.

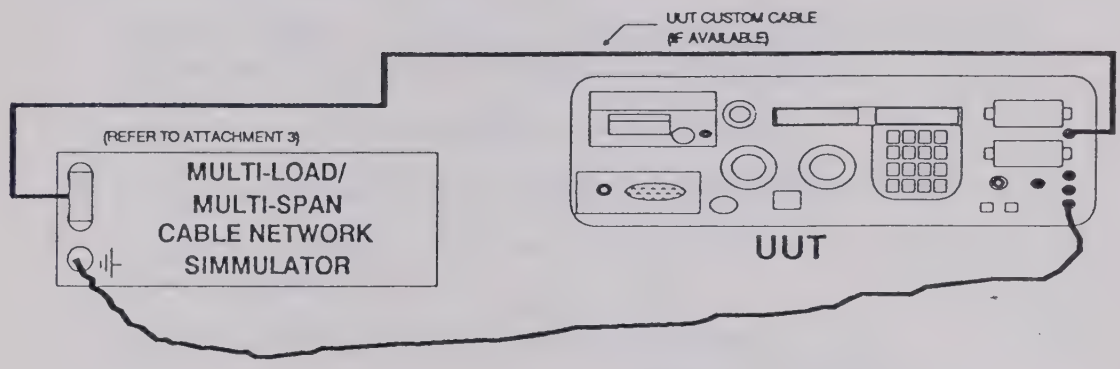


Figure 4-10. Impeadance Tests

.2 Select pair 0 on the UUT OLD rotary switch.

.3 Perform the following key press sequence: STOP, ID, RES, OLD, 4, 0, 0, START.

.4 Record the reference impeadance value of the 3000' Distance Simmulator @ 400 Hz on the Calibrattion Data Sheet (this value will be used to calculate the UUT error).

.5 Record The UUT indication on the Calibration Data Sheet.

.6 The UUT's error may be calculated as a percentage of nominal as follows:
((UUT's Indication - Reference Value) / Reference Value) X 100

.7 Perform the following key press sequence: STOP, ID, RES, OLD, 1, 0, 0, 0, START.

.8 Record the reference impeadance value of the 3000' Distance Simmulator @ 1000 Hz on the Calibrattion Data Sheet.

.9 Record The UUT indication on the Calibration Data Sheet.

.10 Perform the following key press sequence: STOP, ID, RES, OLD, 4, 0, 0, 0, START.

.11 Record the reference impeadance value of the 3000' Distance Simmulator @ 4000 Hz on the Calibrattion Data Sheet.

4.4.4.12 Record The UUT indication on the Calibration Data Sheet.

4.4.5 Load Coil Measurements

NOTE: Throughout this section, Key Press sequence instructions are given assuming the first distance module (part of the Multi-Load/Multi-Span Network Simmulator) used is a nominal 3000 ft. If characterization of the module proves this not to be the case, it will be necessary to use the characterized value in the Key Press sequence (i.e. in place of: MAN, RES, 3, START, OLD, a module of 3326 ft would use: MAN, RES, 3, ., 3, START, OLD).

4.4.5.1 Set the Multi-Load/Multi-Span Network Simmulator switch S-1 to the CLOSED position and switch S-2 to the OPEN position. (see Attachment 3)

.2 Set the UUT OLD PAIR rotary switch to the Pair 0 position.

.3 Perform the following UUT Key Press Sequence: MAN, RES, 3, START, OLD.

.4 The UUT will execute the test sequence program and print a report of the measured loads and distances.

.5 Compare the UUT print out to the one displayed in figure 4-11.

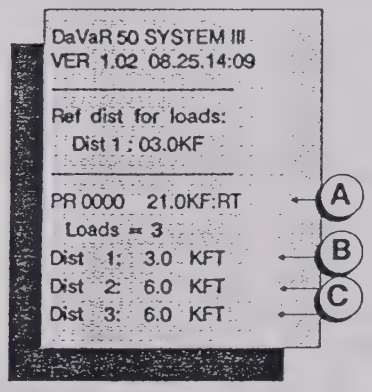


Figure 4-11. Three Load Test

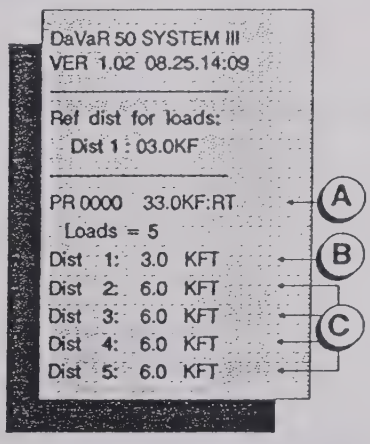


Figure 4-12. Five Load Test

.6 Make the following observations and record PASS on the Calibration Data Sheet if all criterion are met:.

1. The number of loads on the UUT print out equals 3.
2. The total distance ("A" in Figure 4-11) on the UUT print out equals the sum of the four modules used in this test (1ea 3000 ft and 3ea 6000 ft {*characterized values must be used for modules off nominal*}) +/- 5% of the true total distance.
3. The distance ("B" in Figure 4-11) on the UUT print out equals the True Distance of the 3000 ft module used +/- 5% of the true distance.
4. The distance ("C" in Figure 4-11) on the UUT print out equals the True Distance of each 6000 ft module used +/- 5% of the true distance.

.7 Press the UUT RESET key.

.8 Set the Multi-Load/Multi-Span Network Simmulator switch S-1 to the CLOSED position and switch S-2 to the CLOSED position. (see Attachment 3)

.9 Perform the following UUT Key Press Sequence: MAN, RES, 3, START, OLD.

.10 The UUT will execute the test sequence program and print a report of the measured loads and distances.

.11 Compare the UUT print out to the one displayed in figure 4-12.

.12 Make the following observations and record PASS on the Calibration Data Sheet if all criterion are met:.

1. The number of loads on the UUT print out equals 5.
2. The total distance ("A" in Figure 4-12) on the UUT print out equals the sum of the six modules used in this test (1ea 3000 ft and 5ea 6000 ft {*characterized values must be used for modules off nominal*}) +/- 10% of the true total distance.
3. The distance ("B" in Figure 4-12) on the UUT print out equals the True Distance of the 3000 ft module used +/- 10% of the true distance.
4. The distance ("C" in Figure 4-12) on the UUT print out equals the True Distance of each 6000 ft module used +/- 10% of the true distance.

4.5 Communications Tests

NOTE: If Telephone Hand Sets are used, switch them on and leave them on throughout this section.

4.5.1 Talk Connection test

4.5.1.1 Connect the equipment as shown in figure 4-13.

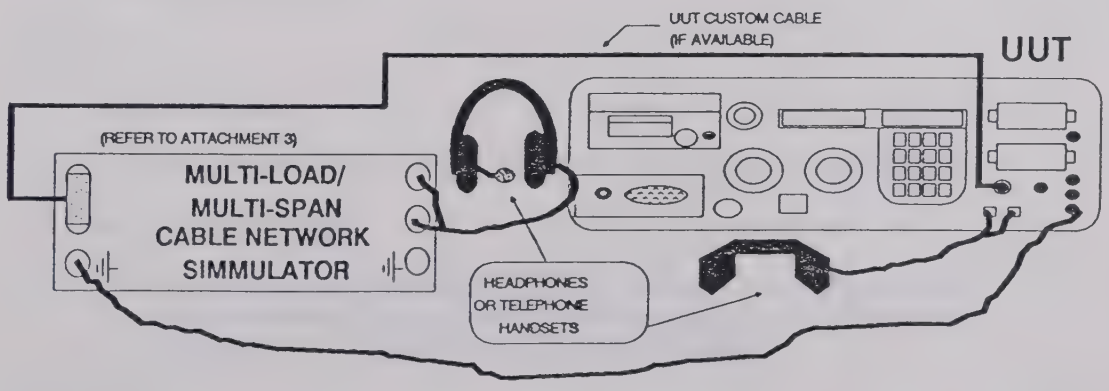


Figure 4-13. Talk Connections Test

4.5.1.2 Press the UUT RESET key.

.3 Set Multi-Load/Multi-Span Cable Network Simmulator switches S-1 and S-2 to the CLOSED position (see attachment 3).

.4 Disconnect one Headphone/Handset lead(any one) from the UUT.

.5 Set the UUT Volume control to approximately mid range.

.6 Make the following observations and record PASS on the Calibration Data Sheet if all criterion are met:.

1. Re-connect the lead disconnected in step 4.5.1.3 and observe that the UUT generates a tone for approximately three seconds.
2. Observe that total duplex communications (the ability to talk and listen over both Head Sets/Hand Sets) are possible between Head Sets/Hand Sets.

4.5.2 Data Transmission (non-active line) Test

4.5.2.1 Disconnect the Headphone/Handset from the UUT then perform the following UUT key press sequence: STOP, MAN, REF, 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, I.D., AUTO.

.2 Make the following observations and record PASS on the Calibration Data Sheet if all criterion are met:.

1. Observe that the UUT displays: "AC 0123456789*#" (the "#" symbol may have a somewhat different appearance, yet still be recognizable).
2. While monitoring the Head Set/ Hand Set connected to the distant side (side opposite the one connected to the UUT {*Output*}) of the Multi-Load/Multi-Span Cable Network Simmulator, press the UUT START key and observe that the Touch Tone Data Stream generated by the UUT is audible at a comfortable level over the 33,000 ft - 6 load simmulation.

.3 disconnect the equipment.

5.0 Labels

5.1 Calibration Labels

5.1.1 Observing correct dates, affix the appropriate calibration label to the UUT

5.2 Calibration Void Labels

5.2.1 Affix the "Calibration Void if Seal is Broken" label/s in a manner that will prevent access to the inner UUT or calibration adjustments. Do not cover areas that are designed for user accessibility, such as battery compartments.

6.0 References

6.1 Communications Technology, DaVaR Sysytem III Operations manual

6.2 ESC Metrology Quality Assurance Manual

SERIAL #:_____ BAR CODE:_____

DAVAR 50 or CAS 2000 CALIBRATION DATA SHEET

STAMP #:_____ REPORT #:_____

MCP STEP NO.	FUNCTION TESTED	NOMINAL VALUE	AS RECEIVED VALUE	AS RETURNED VALUE	OUT OF TOL.	TOLERANCE BAND
4.1	SELF TESTS					
4.1.1	SYSTEM TEST	PASS				PASS/FAIL
4.1.2	PRINTER TEST	PASS				PASS/FAIL
4.2	AUTO BUZZ TESTS					
4.2.2.3	OPEN TEST	PASS				PASS/FAIL
4.2.3.6	BRIDGE TEST	PASS				PASS/FAIL
4.2.4.4	LOOP-BACK TEST	PASS				PASS/FAIL
4.2.5.5	SIMMULATED TROUBLES TEST	PASS				PASS/FAIL
4.3	TONE, PROBE, AND TRACE TONE TESTS					
4.3.1.5	TRACE TONE DETECTION WITH THE AMP PROBE	PASS				PASS/FAIL
4.3.2.5	SENDING TONE ON OLD PAIR #0 FREQUENCY TEST	PASS				PASS/FAIL
4.3.2.6	SENDING TONE ON OLD PAIR #0 INTERRUPTION TEST	PASS				PASS/FAIL
4.3.2.7	SENDING TONE ON OLD PAIR #0 AMPLITUDE TEST	PASS				PASS/FAIL
4.3.3.3	SENDING TONE ON ALL PAIRS (OLD AND NEW)	PASS				PASS/FAIL
4.4	METERING CIRCUITS TESTS					
4.4.1.5	0-75 VDC RNG @ 25 V	25.0 VDC				24.8 TO 25.2 VDC
4.4.1.6	0-75 VDC RNG @ 50 V	50.0 VDC				48.5 TO 50.5 VDC
	0-75 VDC RNG @ 74 V	74.0 VDC				73.3 TO 74.7 VDC
	75-250 VDC RNG @ 80 V	80.0 VDC				78.4 TO 81.6 VDC

COMMENTS:

SERIAL #:_____ BAR CODE:_____

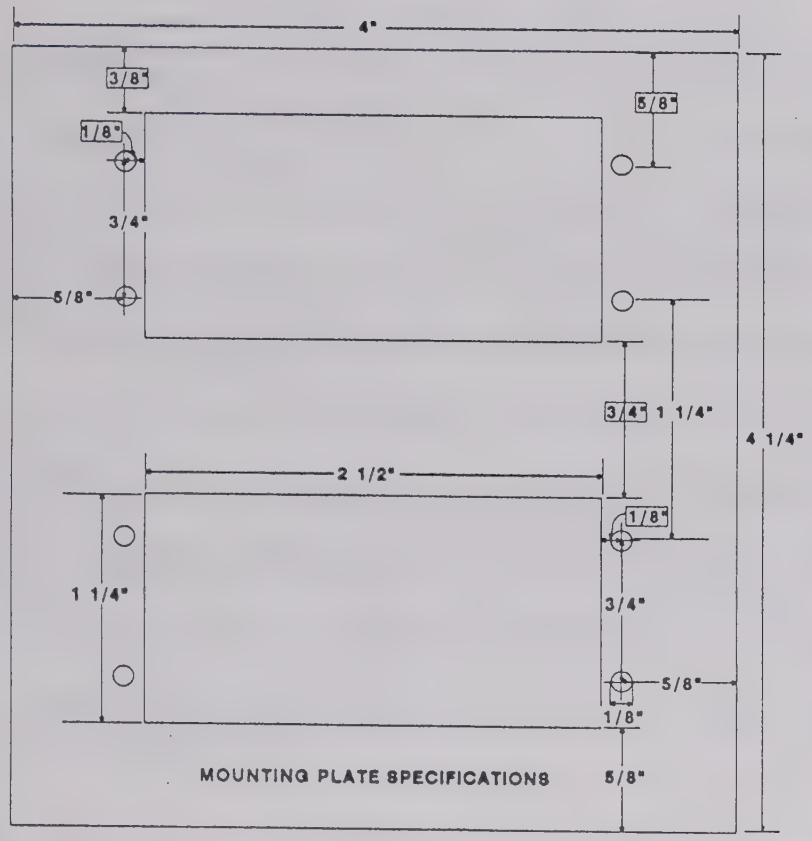
DAVAR 50 or CAS 2000 CALIBRATION DATA SHEET

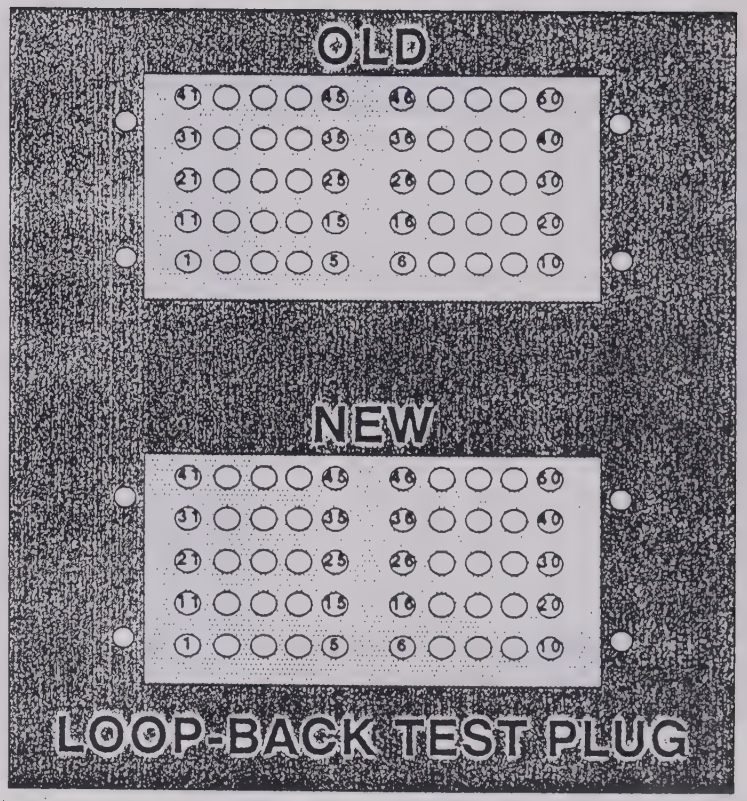
STAMP #:_____ REPORT #:_____

MCP STEP NO.	FUNCTION TESTED	NOMINAL VALUE	AS RECEIVED VALUE	AS RETURNED VALUE	OUT OF TOL.	TOLERANCE BAND
4.4 CONTINUED	METERING CIRCUITS TESTS					
4.4.1.6 CONTINUED	0-250 VDC RNG @ 245 V	245 VDC				240 TO 250 VDC
4.4.2.4	0-100K OHM @ 40K OHMS	40.0K OHMS				39.6 TO 40.4K OHMS
4.4.2.5	0-100K OHM @ 90K OHMS	90.0K OHMS				89.2 TO 80.8K OHMS
↓	100-330K OHM @ 120K OHMS	120K OHMS				118 TO 122K OHMS
	100-330K OHM @ 200K OHMS	200K OHMS				196 TO 204K OHMS
	100-330K OHM @300K OHM	300K OHMS				294 TO 306K OHMS
	330K-1.5M OHM @ 400K OHMS	400K OHMS				380 TO 420K OHMS
	330K-1.5M OHM @ 1.2 M OHMS	1.2M OHMS				1.14 TO 1.26M OHMS
4.4.3.9	200 - 8KFT RNG @ 0.0830ufd	5.28 KFT				5.18 TO 5.38 KFT
4.4.3.10	200 - 8KFT RNG @ 0.0830ufd	.083 ufd				.082 TO .084 ufd
4.4.4.4	3000 FOOT SPAN SIMMULATOR @ 400 Hz	REFERENCE				N\A
4.4.4.5	MEASURED IMPEADANCE @ 400 Hz	SAME AS 400Hz REFERENCE IMPEADANCE				+/- 2% I.V.
4.4.4.8	3000 FOOT SPAN SIMMULATOR @ 1000 Hz	REFERENCE				N\A
4.4.4.9	MEASURED IMPEADANCE @ 1000 Hz	SAME AS 1000Hz REFERENCE IMPEADANCE				+/- 2% I.V.
4.4.4.11	3000 FOOT SPAN SIMMULATOR @ 4000 Hz	REFERENCE				N\A
4.4.4.12	MEASURED IMPEADANCE @ 4000 Hz	SAME AS 4000Hz REFERENCE IMPEADANCE				+/- 2% I.V.
4.4.5.6	LOAD COIL MEAS. TEST (THREE LOADS)	PASS				PASS/FAIL
4.4.5.12	LOAD COIL MEAS. TEST (FIVE LOADS)	PASS				PASS/FAIL
4.5	COMMUNICATIONS TESTS					
4.5.1.6	TALK CONNECTION TEST	PASS				PASS/FAIL
4.5.2.2	DATA TRANS. TEST (NON-ACTIVE LINE)	PASS				PASS/FAIL

COMMENTS:

LOOP-BACK TEST PLUG SPECIFICATIONS





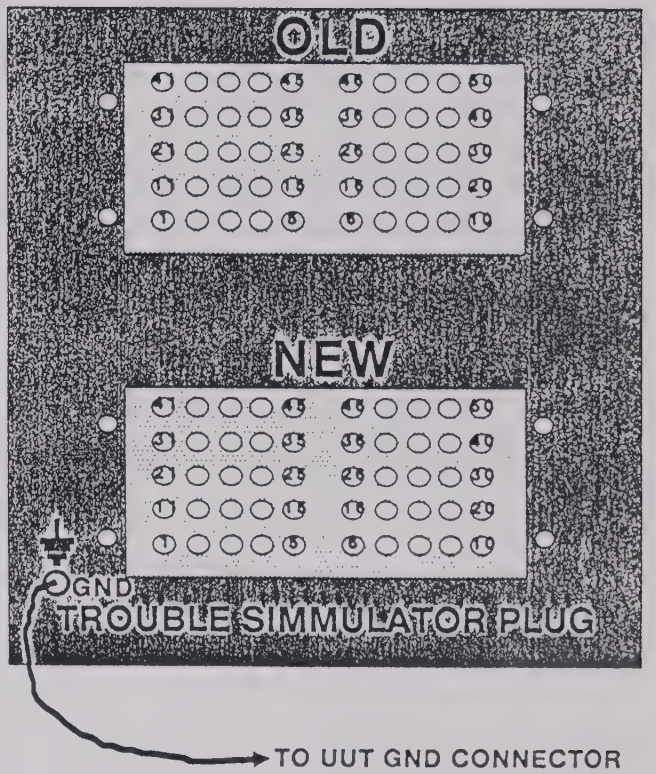
NOTE: ALL CONNECTIONS ARE DIRECT PIN TO PIN (I.e. OLD #1 to NEW #1, OLD #2 to NEW #2)

TROUBLE SIMMULATION PLUG SPECIFICATIONS

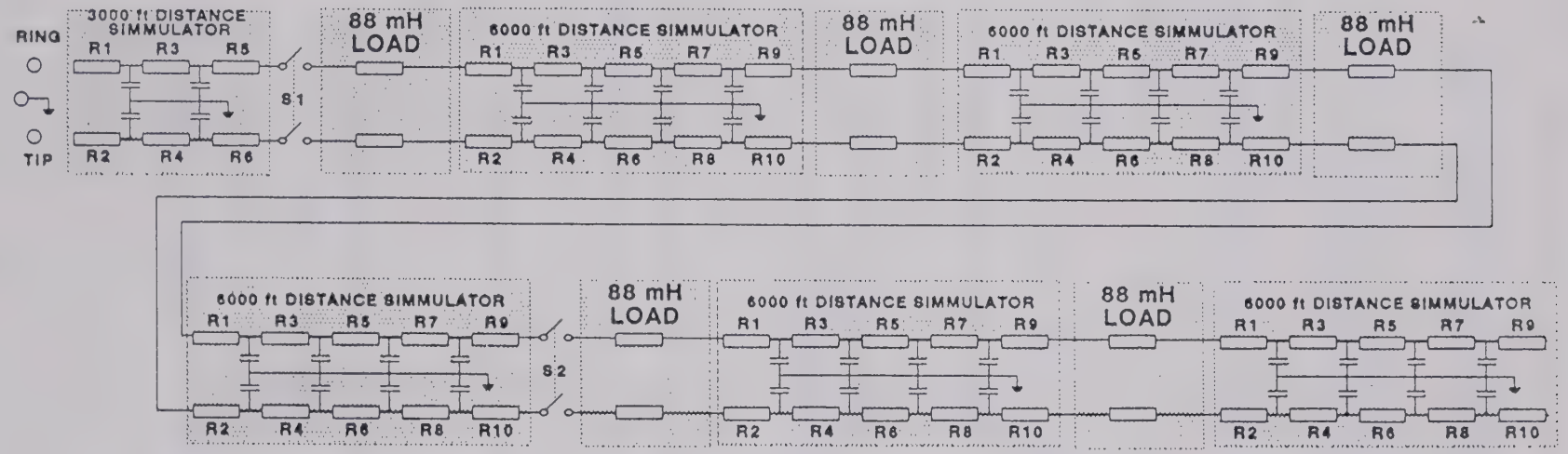
REFER TO ATTACHMENT 1 FOR MOUNTING PLATE SPECIFICATIONS

OLD TO NEW CONNECTOR WIRING TABLE
(shaded areas represent pre-configured "troubles")

OLD #50	NEW #50	OLD #40	NEW #40	OLD #30	NEW #30	OLD #20	NEW #20	OLD #10	NEW #10
		10KOHM						TIP & RING TO GND	
OLD #49	NEW #49	OLD #39	NEW #39	OLD #29	NEW #29	OLD #19	NEW #19	OLD #09	NEW #09
		10 KOHM SHORT							
OLD #48	NEW #47	OLD #38	NEW #38	OLD #28	NEW #28	OLD #18	NEW #18	OLD #08	NEW #08
COLOR REVERSAL				OPEN PAIR		TIP TO GND			
OLD #47	NEW #48	OLD #37	NEW #37	OLD #27	NEW #27	OLD #17	NEW #17	OLD #07	NEW #07
OLD #46	NEW #46	OLD #36	NEW #36	OLD #26	NEW #26	OLD #16	NEW #16	OLD #06	NEW #06
		TIP OPEN							
OLD #45	NEW #45	OLD #35	NEW #35	OLD #25	NEW #25	OLD #15	NEW #15	OLD #05	NEW #05
TIP TO RING SHORT									
OLD #44	NEW #44	OLD #34	NEW #34	OLD #24	NEW #24	OLD #14	NEW #14	OLD #04	NEW #02
				RING TO TIP CROSS					
OLD #43	NEW #43	OLD #33	NEW #33	OLD #23	NEW #23	OLD #13	NEW #13	OLD #03	NEW #01
						RING TO GND		TWO PAIRS TRANSPOSED	
OLD #42	NEW #42	OLD #32	NEW #32	OLD #22	NEW #22	OLD #12	NEW #12	OLD #02	NEW #04
OLD #41	NEW #41	OLD #31	NEW #31	OLD #21	NEW #21	OLD #11	NEW #11	OLD #01	NEW #03
		RING OPEN							



MULTI-LOAD/MULTI-SPAN CABLE NETWORK SIMM



PARTS REQUIRED (PER MODULE):

3000' DISTANCE SIMMULATOR: 8.06 ohm +/- 5% resistor (R1,2,5,6), 4 EA 32.4 ohm +/- 5% resistor (R3,4), 2 EA .0472 ufd +/- 1% capacitor (ALL), 4 EA 88 mH LOAD: 88 mH "Farad Fighter" inductors, 2 EA	6000' DISTANCE SIMMULATOR: 8.06 ohm +/- 5% resistor (R1,2,9,10), 4 EA 32.4 ohm +/- 5% resistor (R3,4,7,8), 4 EA 16.2 ohm +/- 5% resistor (R5,6), 2 EA .0472 ufd +/- 1% capacitor (ALL), 8 EA GENERAL: Double pole, single throw switch (S1,2), 2 EA

ALIGNMENT/REPAIR INSTRUCTIONS

NOTE: The UUT should be fully charged for 24 hrs prior to calibration. The Davar 50 and CAS 2000 will indicate false troubles when batteries are low, even before low battery indications are displayed.

A.1 Preparatory Information

A.1.1 This procedure provides suggested corrective action for failures that may occur during calibration.

A.2 Auto Buzz Tests

A.2.1 Open Test *(4.2.2.3)*

A.2.1.1 If any pair's test results are other than "OPEN" the UUT requires recharging or repair.

.2 Check for possible shorts present in the UUT ribbon cables.

A.2.2 Bridge Test *(4.2.3.6)*

A.2.2.1 If tests results differ from those specified, repair is required.

.2 An open T or open R on a pair may be the result of an open contact on one of the Bridging relays.

A.2.3 Loop-Back Test *(4.2.4.4)*

A.2.3.1 If any pair's test results are other than "BUZZ" the UUT requires recharging or repair.

.2 Check for possible open T or R leads on a pair.

A.3 Tone, Probe, and Trace Tone Tests *(4.3.1.5 through 4.3.3.3)*

A.3.1 If the Frequency or levels of the Trace Tone are out of tolerance the UUT will require repair.

A.4 Metering Circuits Tests

A.4.1 VDC Zero(range)Alignment *(4.4.1.5 and 4.4.1.6)*

A.4.1.1 Perform the following key press sequence: STOP, VOLTS, OLD, and TR.

.2 Select pair 0 on the UUT OLD rotary switch.

.3 With no input applied adjust R5 on the A/D Board located in slot "E" of the UUT to obtain an indication of 0.0 VDC.

A.5 Capacitane Alignment *(4.4.3.9 and 4.4.3.10)*

A.5.1 Reference Alignment

A.5.1.1 Press the UUT REF key and adjust R29 on the A/D Board located in slot "E" of the UUT to obtain a display indication of .083 UFD

.2 Press the UUT CAP key and adjust R91 on the A/D Board located in slot "E" of the UUT to obtain a display indication of 5.28 KFT.

.3 Repeat steps A.5.1.1 and A.5.1.2 as necessary to compensate for interaction.

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